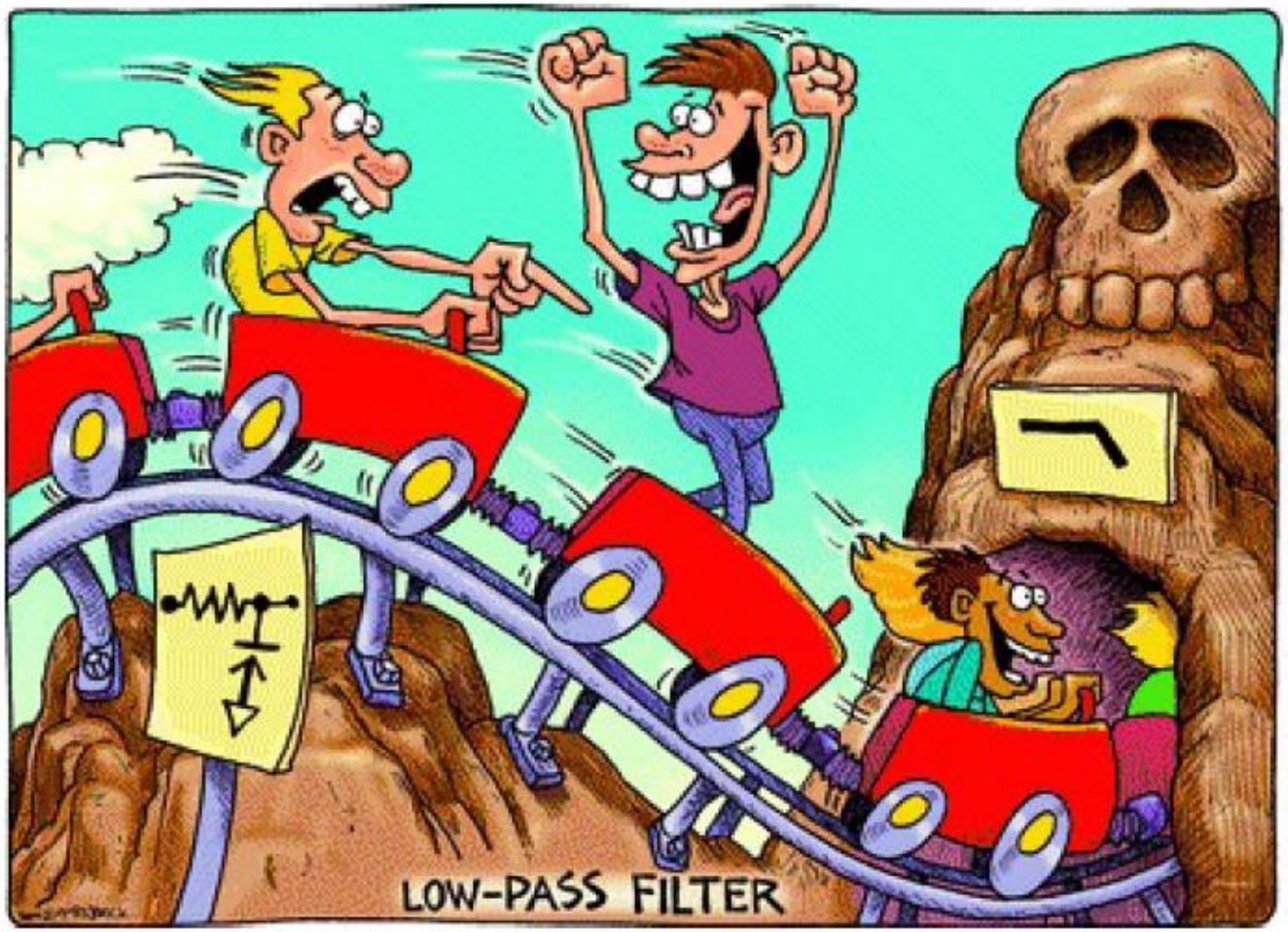
FILTROS

FILTROS

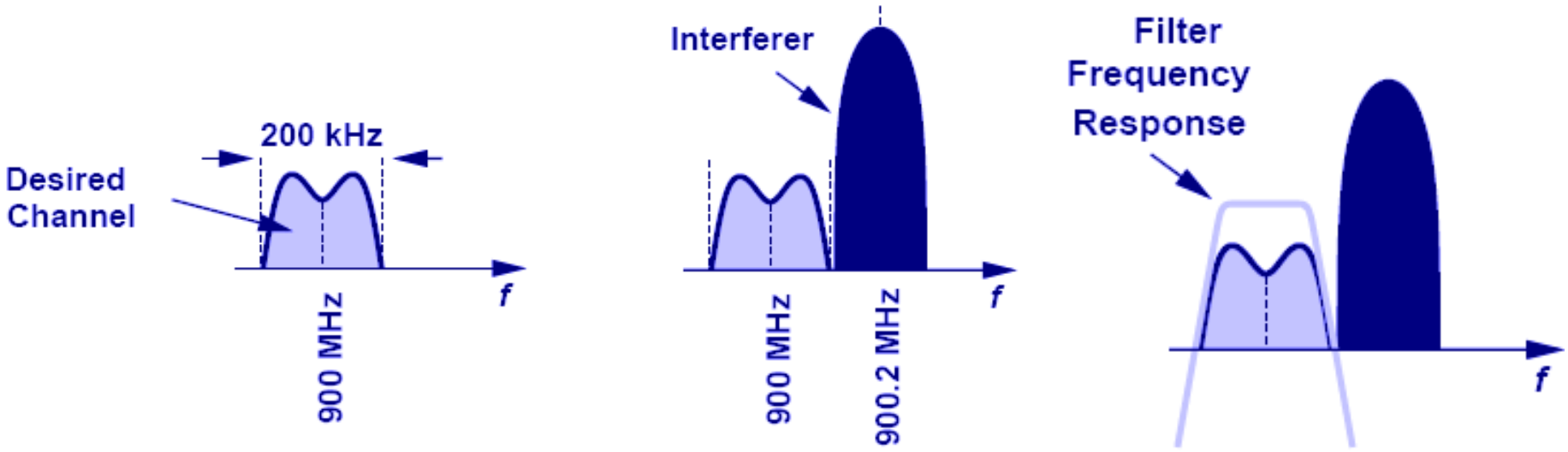
Filtros

Filtros



Filtros

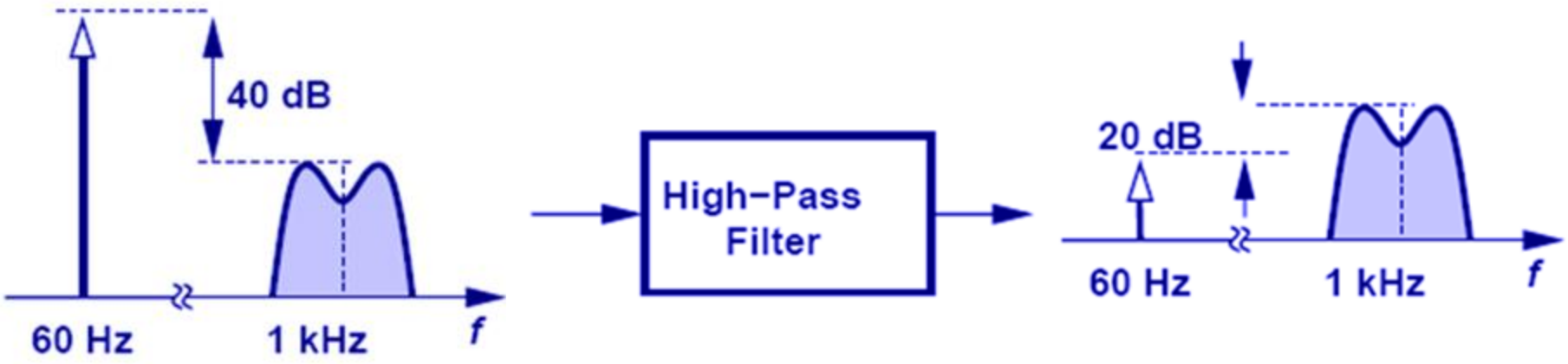
Utilização de filtros em sistemas de telecomunicações



Eliminação (redução) de interferências

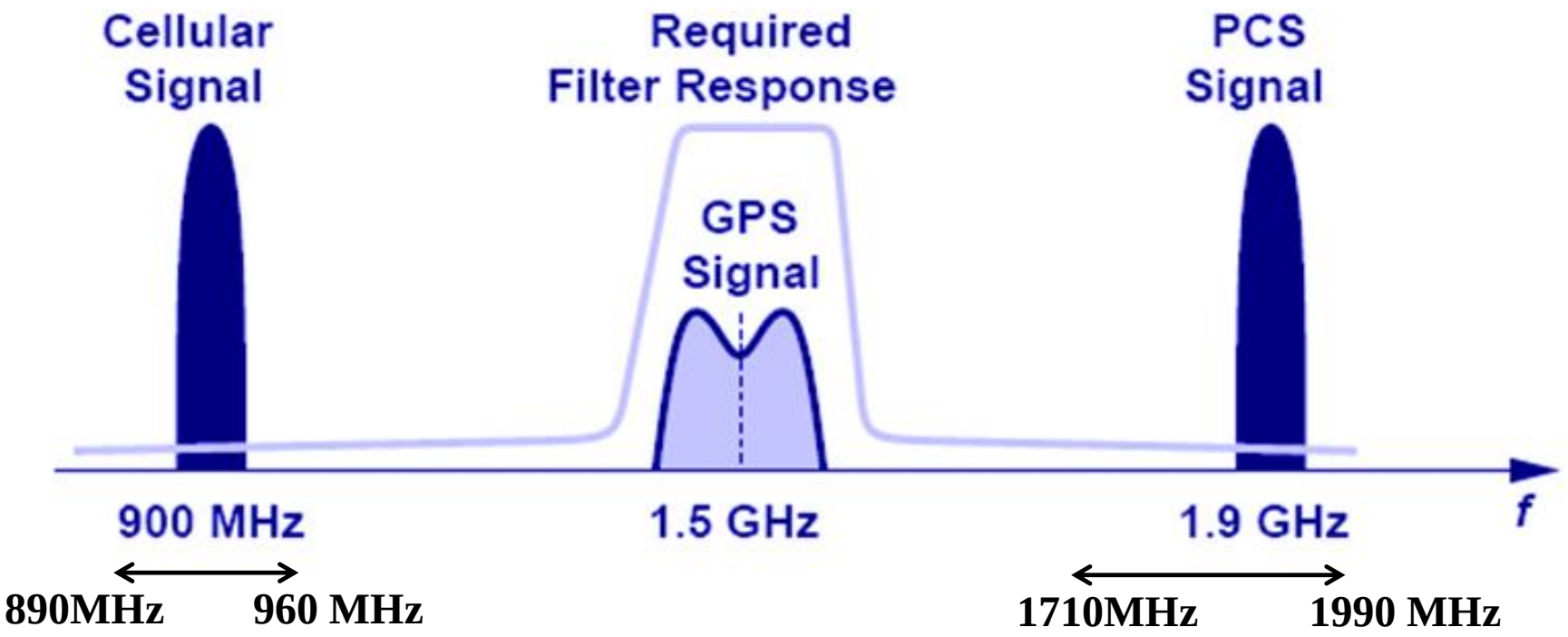
Filtros

Deseja-se amplificar um sinal em 1 kHz onde existe uma forte interferência em 60 Hz proveniente da linha de alimentação. O sinal interferente é cerca de 40 dB maior que o sinal a ser amplificado. Que tipo de filtro e qual atenuação devem ser usados para garantir que o sinal interferente fique 20 dB abaixo do sinal interferente?



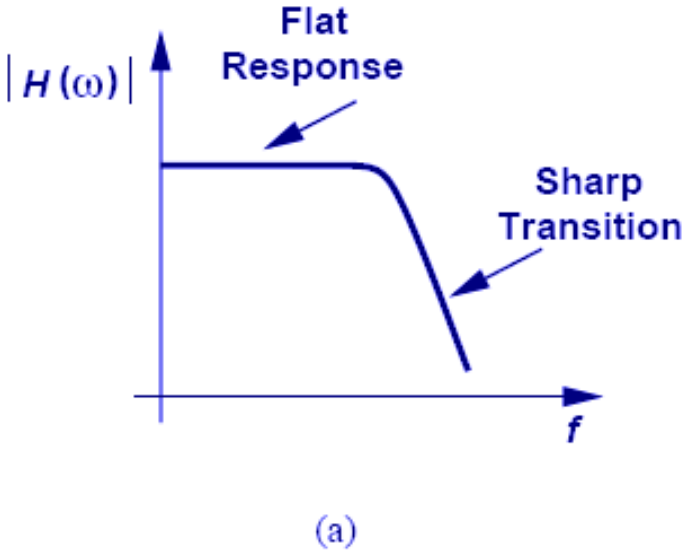
Filtros

A banda de operação de sinais de GPS vai de 1570 a 1580 MHz. Quais interferências podem corromper o sinal de GPS nessa faixa de freqüência? Qual filtro deve ser utilizado para reduzir a interferência?

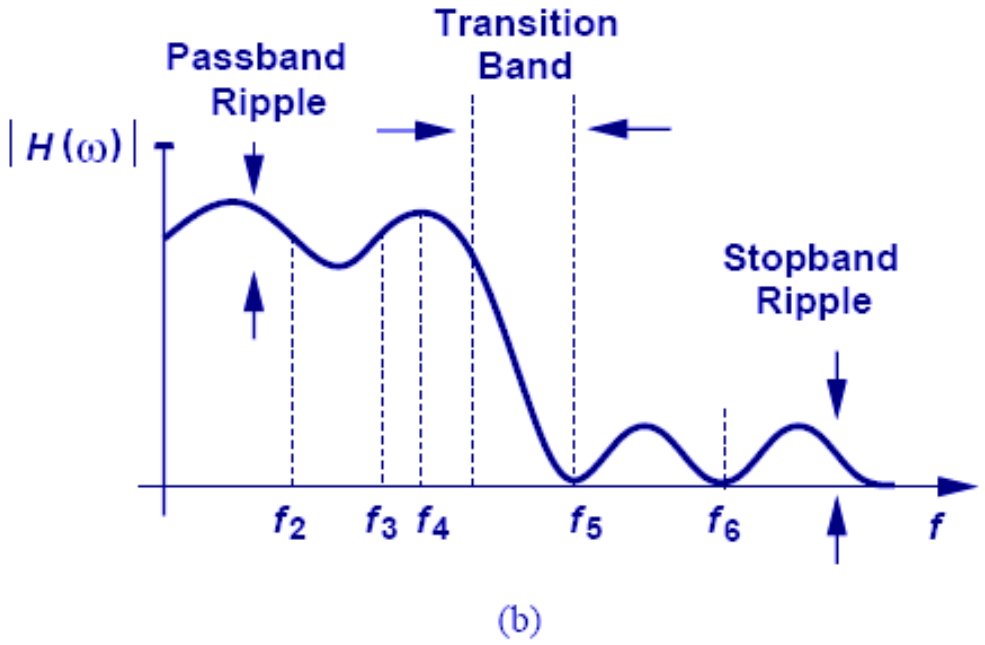


Filtros

Características de filtros



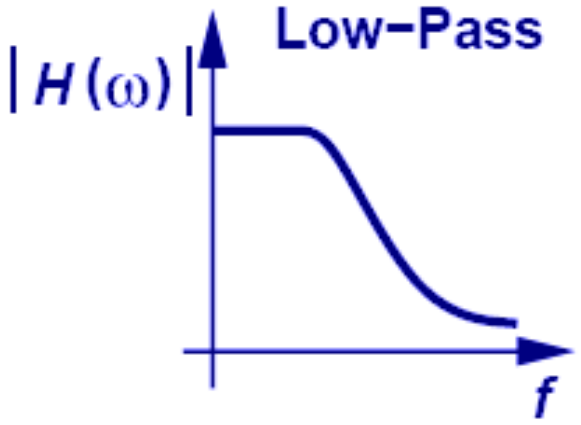
Genérica

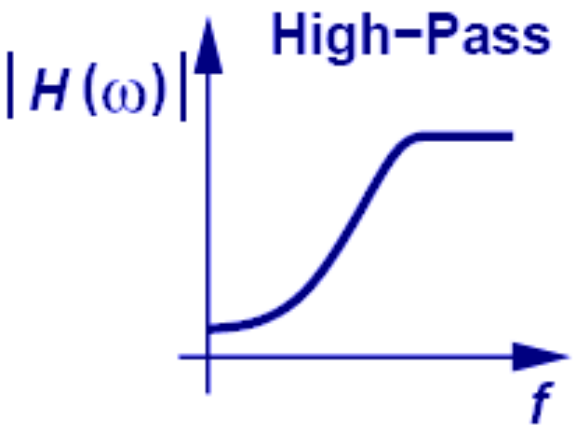


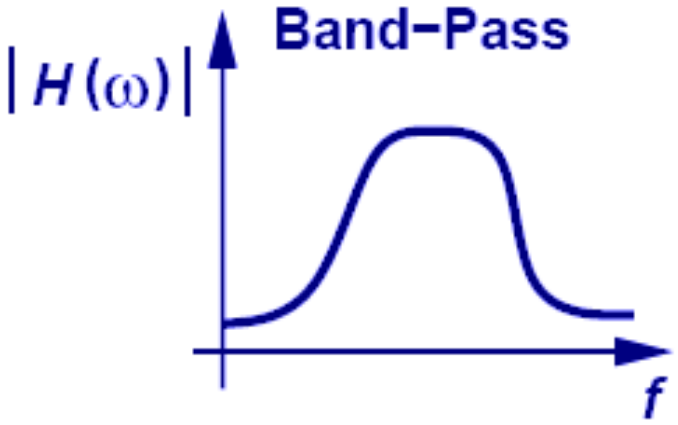
Realista

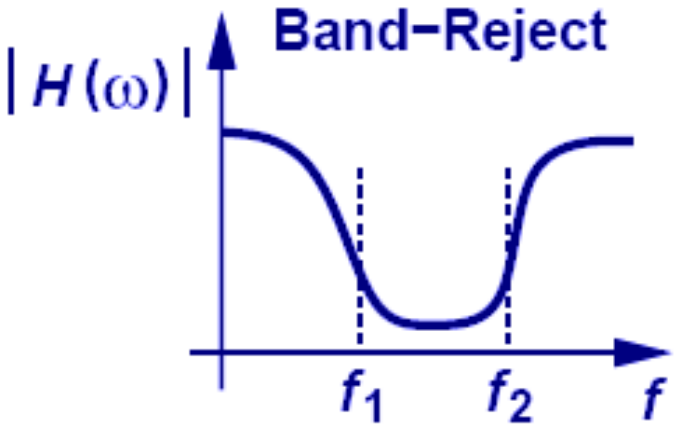
Filtros

Classificação de Filtros - I



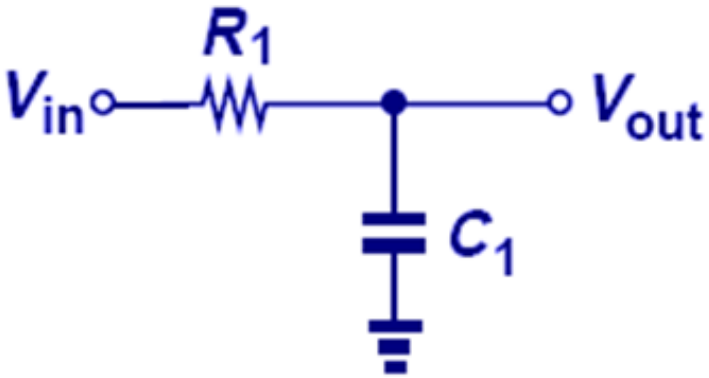




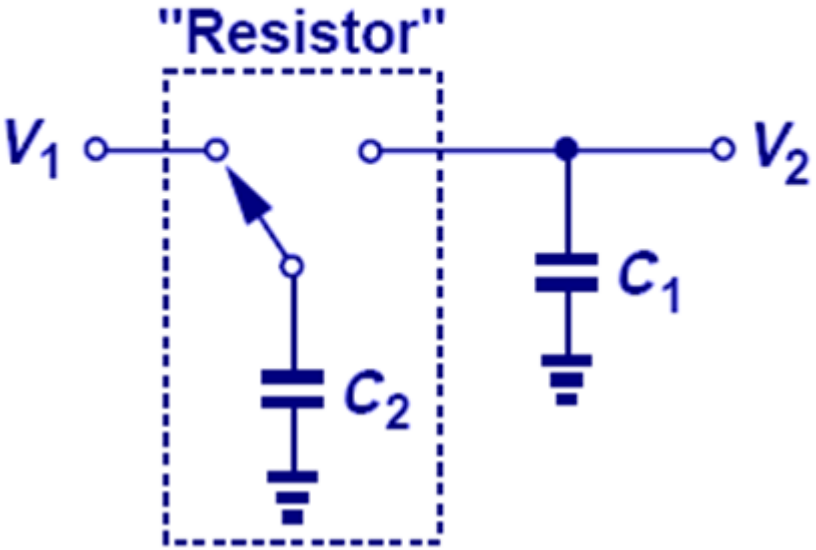


Filtros

Classificação de Filtros - II



$$R_{eff} = \frac{1}{C_2 f}$$

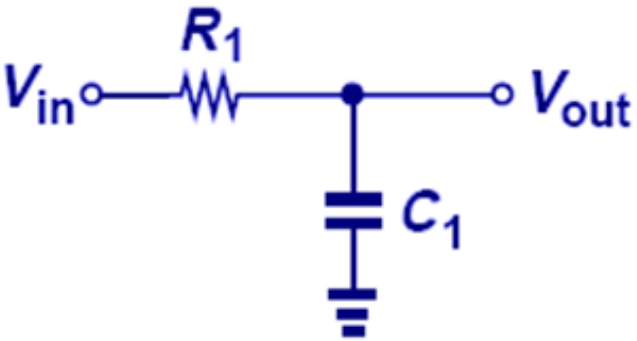


Contínuo

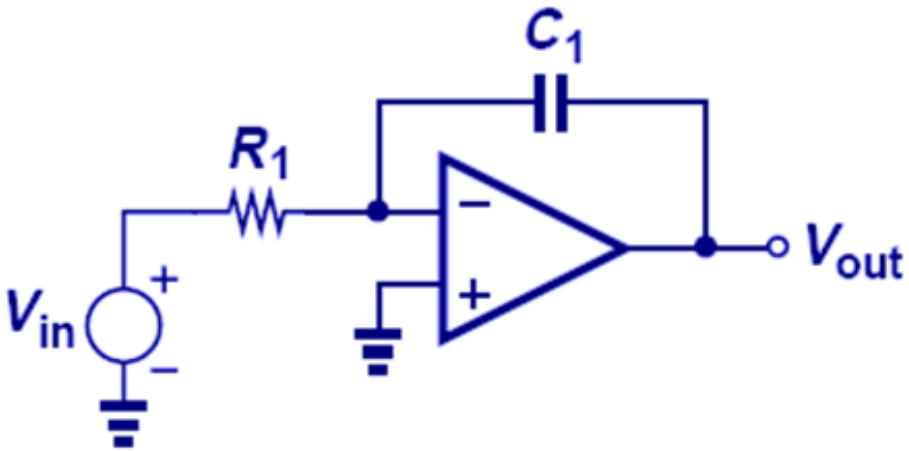
Discreto

Filtros

Classificação de Filtros - III



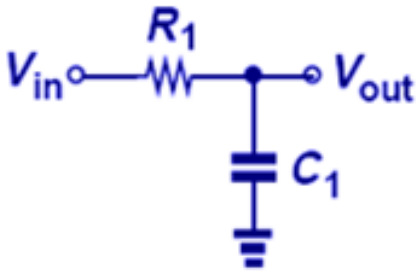
Passivo

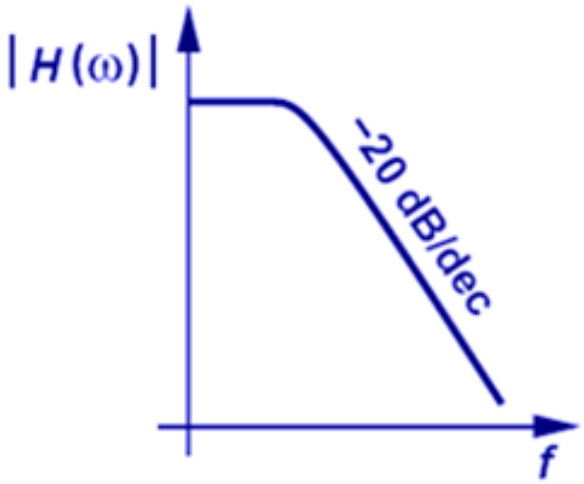


Ativo

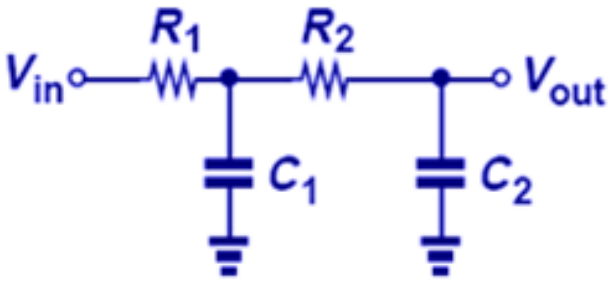
Filtros

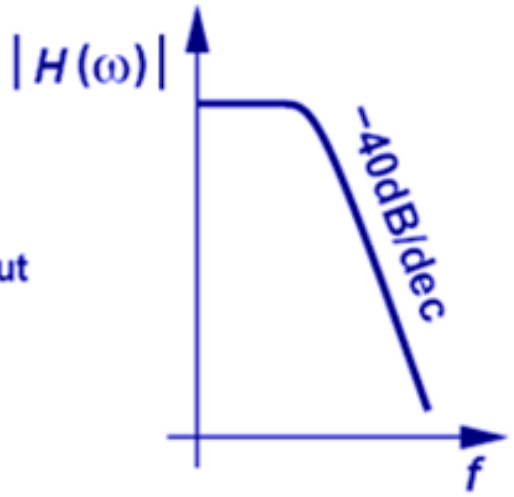
Função de Transferência





1 pólo : 1ª ordem
O filtro com decaimento de 20 dB/dec

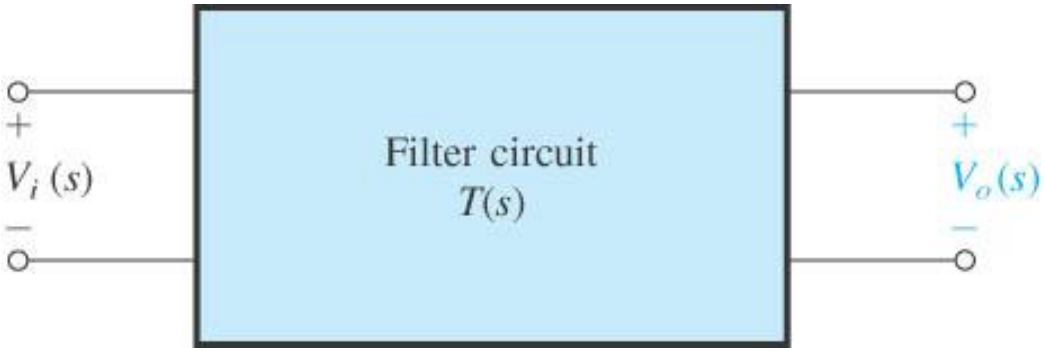




2 pólos : 2ª ordem
O filtro com decaimento de 40 dB/dec; melhor seletividade

Filtros

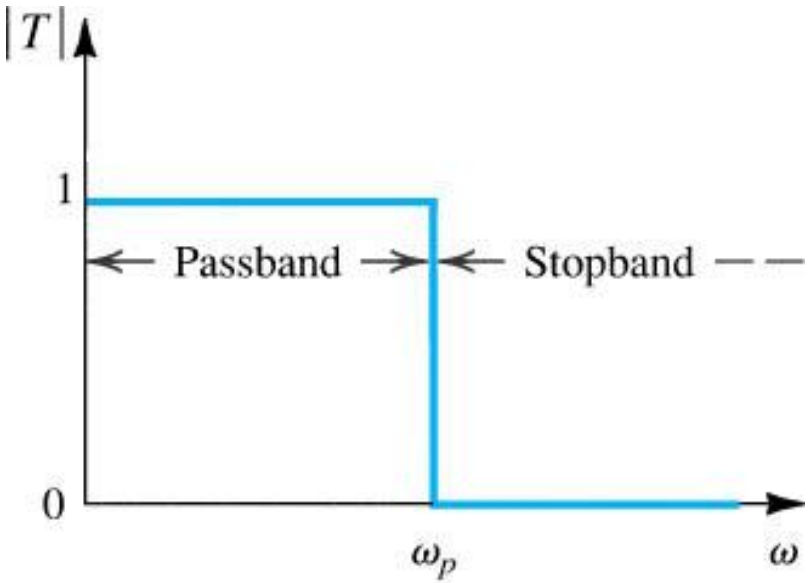
Malha geral de dois acessos de um filtro genérico



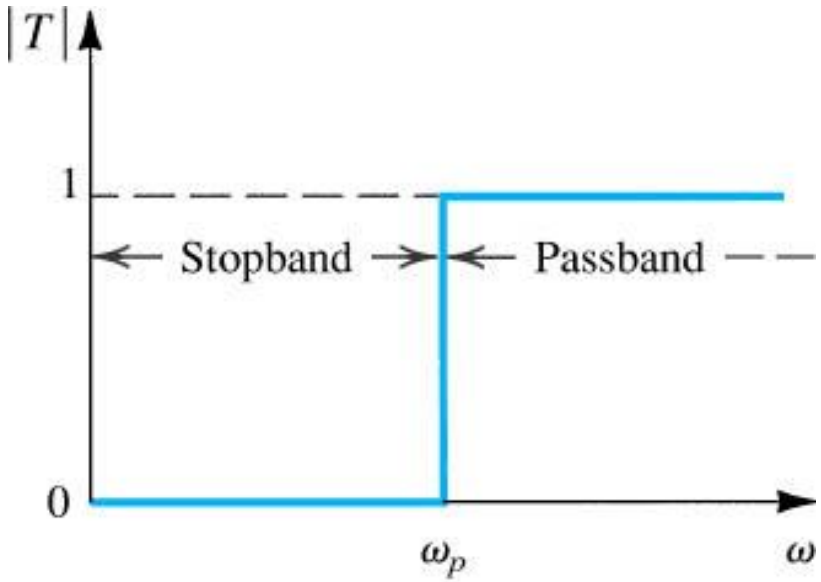
Função de transferência: $T(s) = \dfrac{V_o(s)}{V_i(s)}$

Filtros

Características **ideais** de transmissão de quatro tipo de filtros



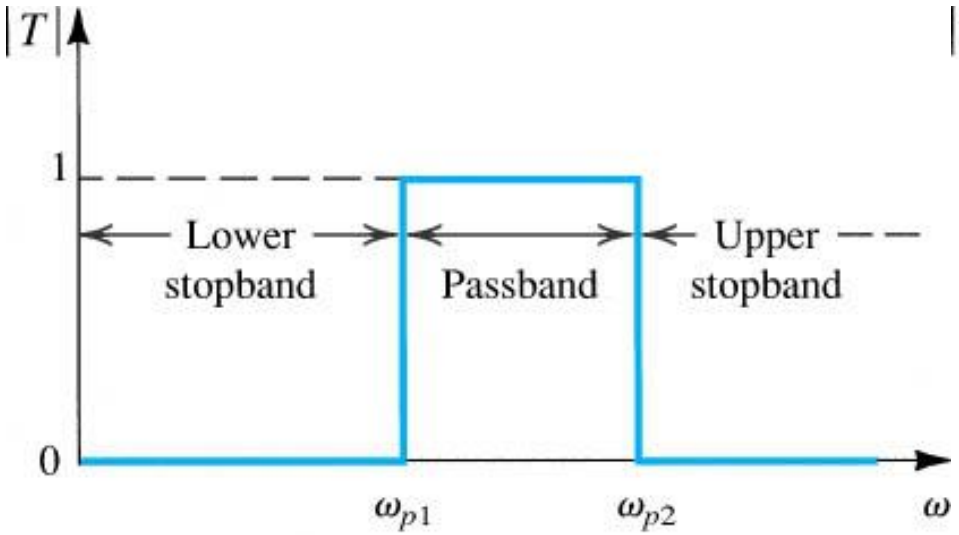
(a) Low-pass (LP)



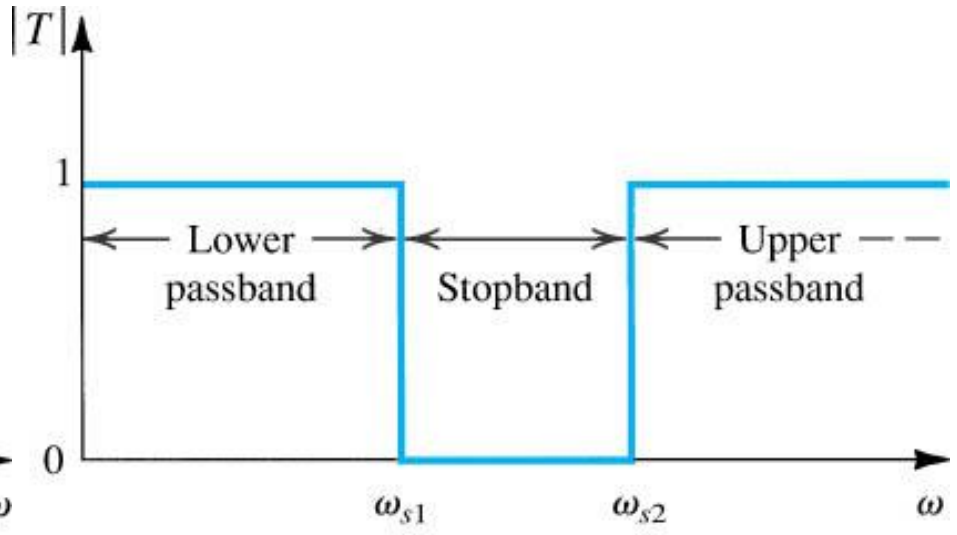
(b) High-pass (HP)

Filtros

Características **ideais** de transmissão de quatro tipo de filtros



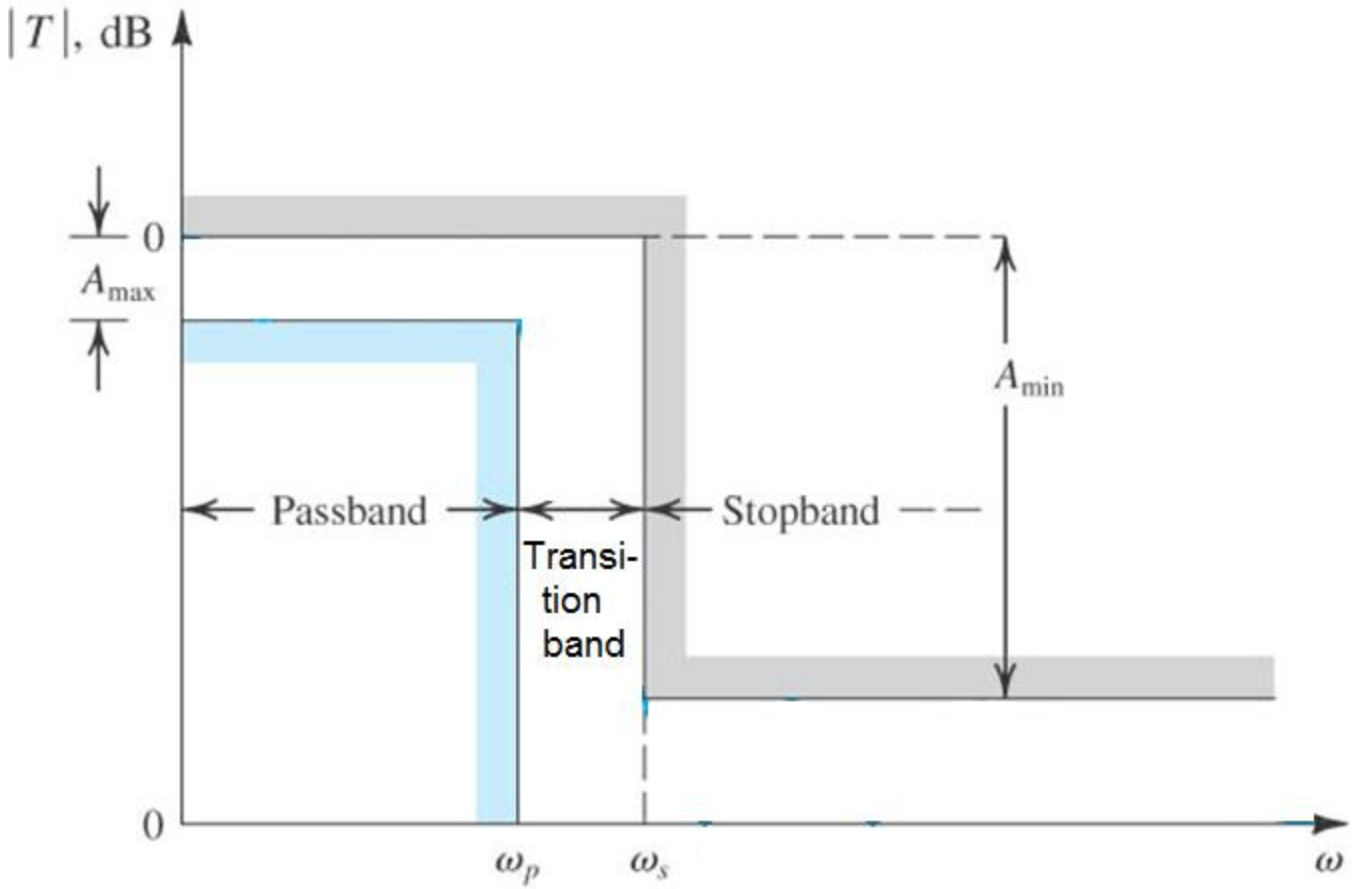
(c) Bandpass (BP)



(d) Bandstop (BS)

Filtros

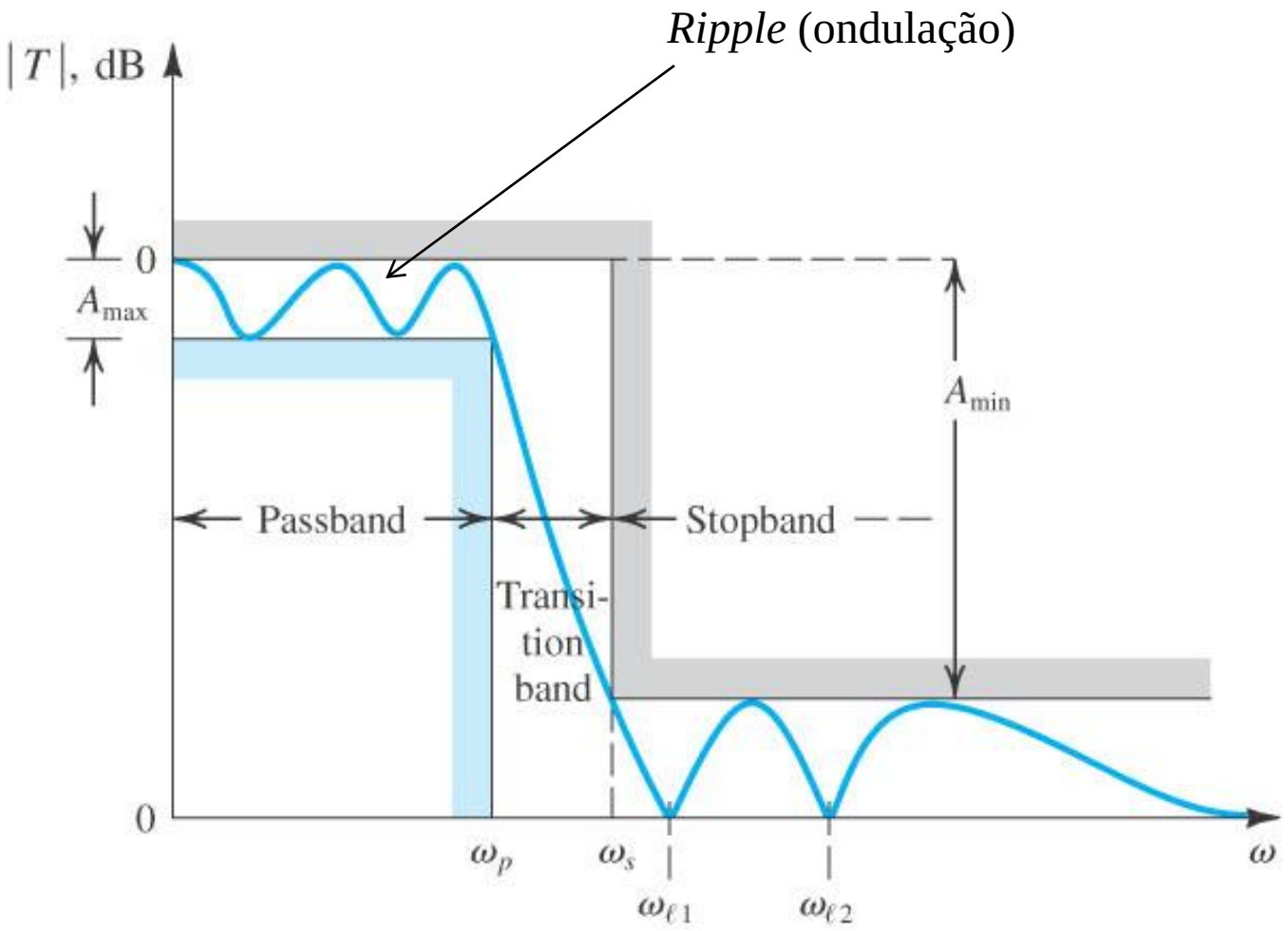
Especificação das Características de transmissão de filtro passa-baixas



$A_{max} \downarrow \quad A_{min} \uparrow \quad \omega_s/\omega_p \approx 1$

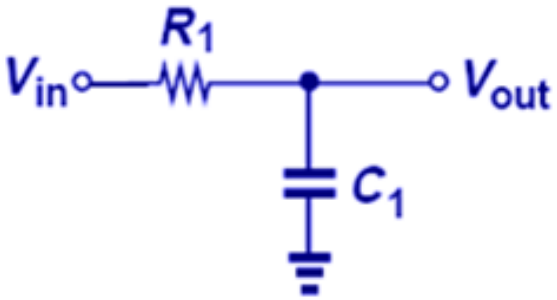
Filtros

Módulo da resposta de um filtro que atende as especificações

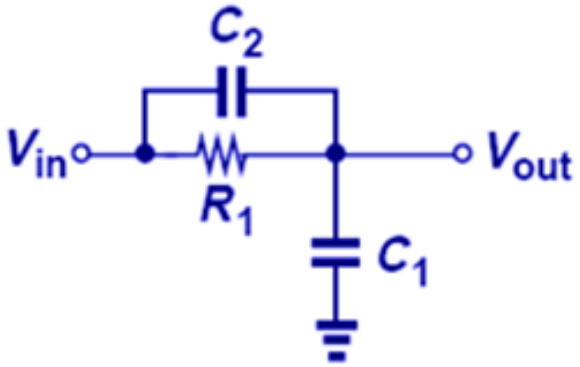


Filtros

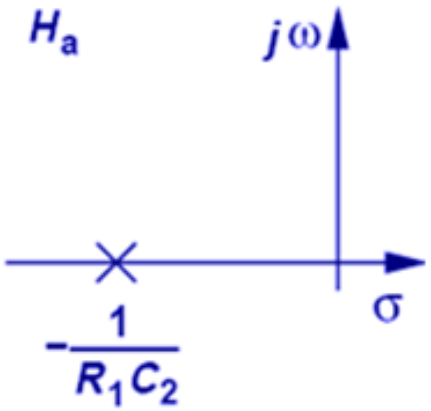
Encontre a função de transferência para os circuitos (a) e (b)



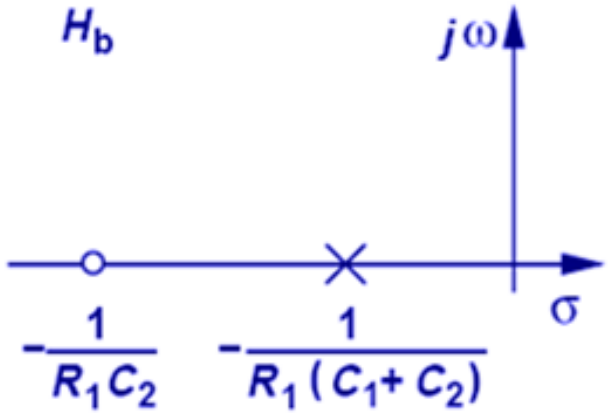
(a)



(b)



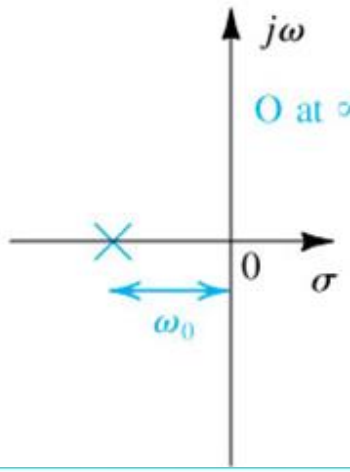
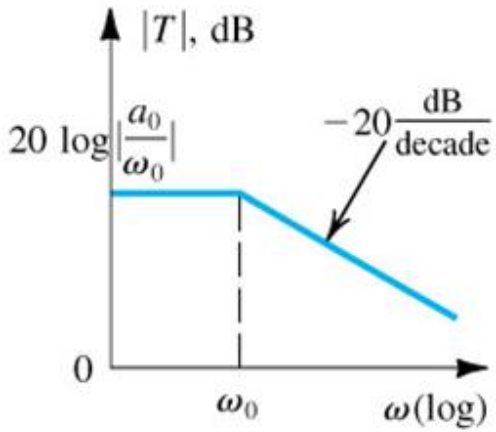
(a)

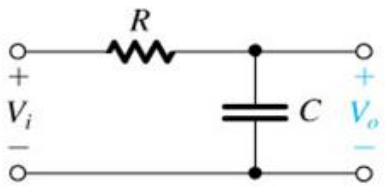
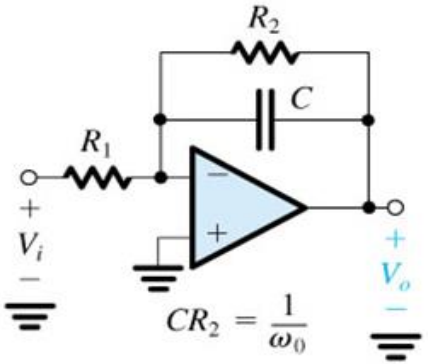


(b)

Filtros

Filtro de 1ª ordem: Passa-Baixas

Filter Type and $T(s)$	s-Plane Singularities	Bode Plot for $\lvert T\rvert$
(a) Low pass (LP) $T(s) = \frac{a_0}{s + \omega_0}$		

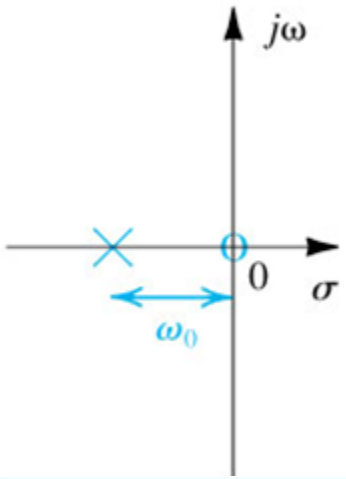
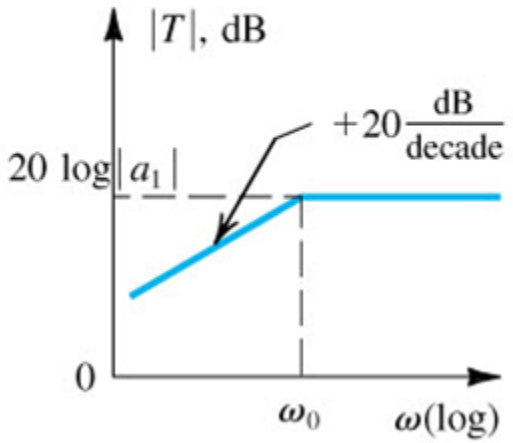
Passive Realization	Op Amp–RC Realization
 $CR = \frac{1}{\omega_0}$ DC gain = 1	 $CR_2 = \frac{1}{\omega_0}$ DC gain = $-\frac{R_2}{R_1}$

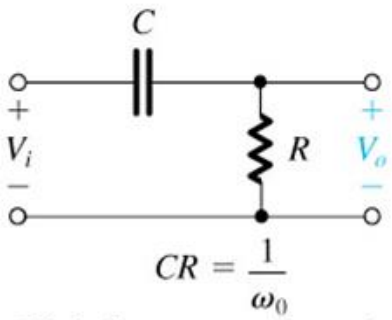
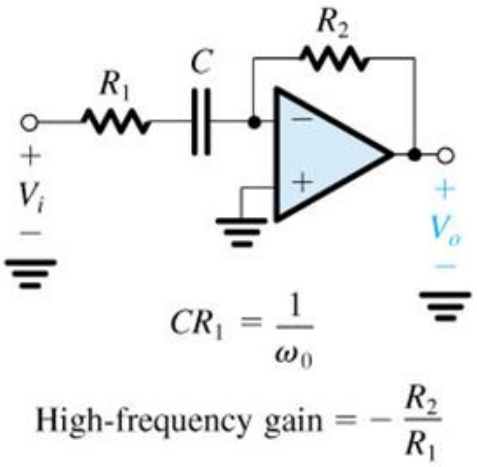
Função de Transferência GERAL:

$$T(s) = \frac{a_1 s + a_0}{s + \omega_0}$$

Filtros

Filtro de 1ª ordem: Passa-Altas

Filter Type and $T(s)$	s-Plane Singularities	Bode Plot for $\lvert T\rvert$
(b) High pass (HP) $T(s) = \dfrac{a_1 s}{s + \omega_0}$		

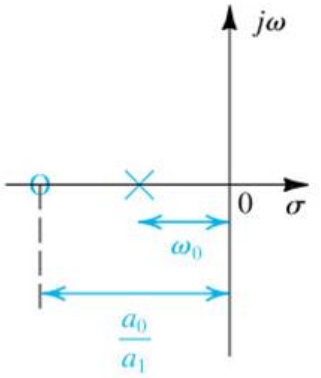
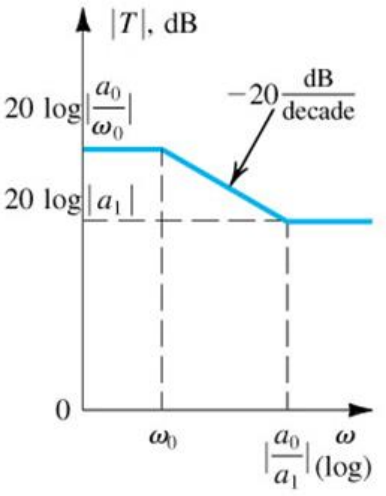
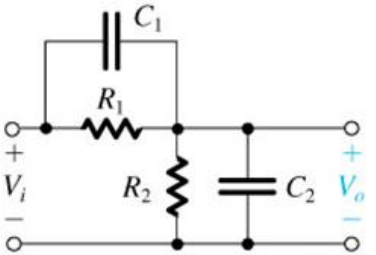
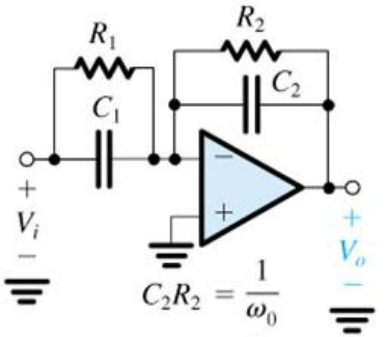
Passive Realization	Op Amp–RC Realization
	

Função de Transferência GERAL:

$$T(s) = \frac{a_1 s + a_0}{s + \omega_0}$$

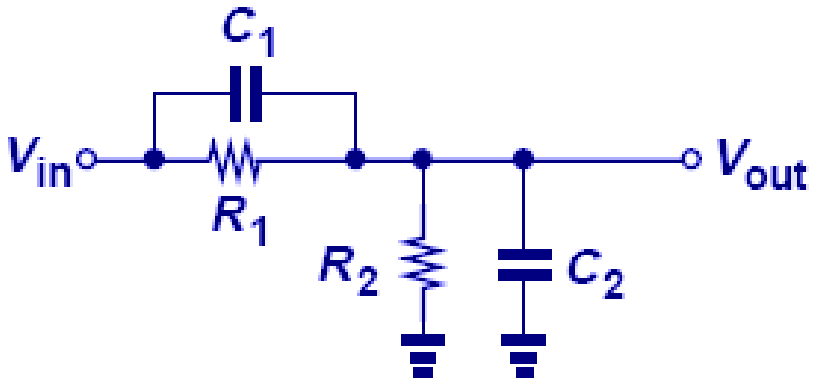
Filtros

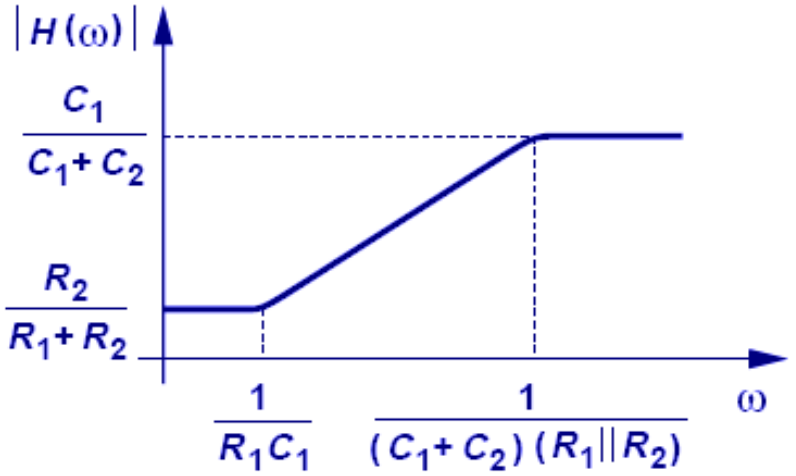
Filtro de 1ª ordem: Genérico

Filter Type and $T(s)$	s-Plane Singularities	Bode Plot for $\lvert T\rvert$	Passive Realization	Op Amp–RC Realization
(c) General $T(s) = \dfrac{a_1 s + a_0}{s + \omega_0}$			 $(C_1 + C_2)\,(R_1 \,//\, R_2) = \dfrac{1}{\omega_0}$ $C_1 R_1 = \dfrac{a_1}{a_0}$ DC gain $= \dfrac{R_2}{R_1 + R_2}$ HF gain $= \dfrac{C_1}{C_1 + C_2}$	 $C_2 R_2 = \dfrac{1}{\omega_0}$ $C_1 R_1 = \dfrac{a_1}{a_0}$ DC gain $= -\dfrac{R_2}{R_1}$ HF gain $= -\dfrac{C_1}{C_2}$

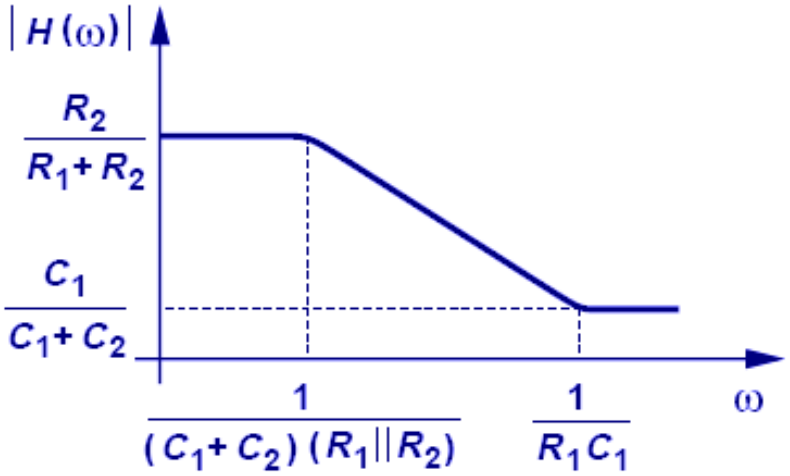
Filtros

Determine a função de transferência do circuito abaixo:





$R_2C_2 < R_1C_1$



$R_2C_2 > R_1C_1$

Filtros

Sugestão de Estudo:

- Sedra & Smith 5ed.
  Cap. 12, itens 12.1 e 12.2

-Razavi. 2ed.
  Cap. 14, itens 14.1 e 14.2

Exercícios correspondentes.